Snohomish River Watershed – WRIA 7

Conditions of the streams and rivers of the Snohomish River watershed range from pristine to moderately impacted to heavily impacted (Pentec 1999). The range of conditions reflects the variety of land uses found in the watershed, including wilderness, commercial forestry, agriculture, residential development, and urbanization. Most of the water bodies greatly affected by human activities drain the suburban foothills or lie in the floodplains or the major rivers. Principal impacts to fish production have resulted from construction of dikes, channelization of floodplain tributaries, elimination of wetlands and estuarine habitat, riparian forest removal, non-point water quality pollution, industrial discharges, fish passage barriers, log rafting, and removal of large wood from channels.

The basin is recovering from some of the past impacts; many impacts of past land use actions remain present in the watershed. Rapid urbanization is the greatest new threat to salmonid habitat in the Snohomish watershed.

Water Quantity

While habitat loss through diking, ditching, wetland loss, loss of estuaries, and floodplain alteration have significantly reduced salmonid productivity, water quantity is also a recognized limiting factor. Low stream flow or associated elevated stream temperatures function as passage barriers and reduce rearing habitat during certain times of the year.

The Department of Ecology set instream flows and year round closures for the Snohomish River and it's tributaries in 1979. These established flows apply only to water right issued after the regulation was established. Instream flow regulations exist at 10 locations along streams within the watershed.

Instream flows on the Snohomish River near Monroe have typically not been met an average of 121 days during the year, especially between mid-July and mid-October. Minimum flows are not met during the month of October in half of all years, and are not met during most of the year (except during spring run off) in oneof ten years.

Up to 95 percent of the water allocated in the Snohomish River basin is from surface water. Municipal use account for 72 percent of the allocations, while 21 percent is used for domestic purposes, and the remainder for irrigation, fish culture and power generation. The 901 surface water rights issued by the Department of Ecology are equivalent to a flow of 743cfs. Allocations represent the volumes legally available for use if all wayter rights are exercised. As the water used approaches the amount allocated , due to continued development of water allocated by Seattle and Everett, further reductions of instream flow will occur. Diversions for municipal water supplies are highest during the summer months.

There is a relatively direct connection between shallow water aquifers and surface water in the Snohomish River watershed. These connections are most obvious during periods of low flows when the primary source of surface flow is shallow ground water. Thus, flows in this watershed are susceptible to increased impervious surface area associated with development, and increases

in the numbers of exempt wells.

Flow Restoration Opportunity

Changes in reservoir storage and management o the Sultan River have helped meet instream flows targets since 1985, however, the number of days that flow requirements have been met annually on the Snoqualmie River has been declining. Applications for appropriating new surface water rights for municipal use total 1000cfs, and applications for municipal groundwater water total 164 cfs.

Any additional appropriations must be reviewed critically to ensure that the established 1979 flows are maintained. Increased impervious surfaces and additional exempt wells alone will continue to have an impact on surface flows.

Because most of the water allocated in this basin is for municipal uses, and considering the current demand for more surface water, there may be little opportunity to acquire surface water in this basin. It is expected that there will be little water available, and that which is available will likely be prohibitively expensive. Acquisition efforts should focus on small tributaries which have water diversions associated with domestic of agricultural use. Stream flow can be reduced by over-allocation of groundwater and by creation of impervious surface, both lowering the water table by reducing groundwater recharge to streams

Marshland Drainages, Wood Creek 07.0036, Larimer Creek 07.0107, Thomas Creek 07.0108, Batt Slough, Hanson Slough

Increased peak flows, decreased summer low flow levels, and high sedimentation rates related to high levels of impervious surface in the headwaters of the Marshland tributaries, adversely impact the quality of salmonid habitat in the Marshland tributaries (Haas 2001); however, a study by Chris Konrad (USGS hydrologist) of perennial streams in the Puget Sound lowland concluded that while urbanization decreased winter baseflow, it did not significantly affect the quantity of summer base flow (study report interpretation by Dan Mathias, City of Everett). Increased impervious surface area associated with land use is the primary factor affecting flows in these sub-basins. Thus, acquisitions of surface waters are unlikely to resolve low flow problems other than perhaps a few localized streams or reaches. Care must be exercised to ensure that any acquisitions result in measurable flow increases.

Pilchuck River Mainstem

The City of Snohomish operates a domestic-supply water diversion dam at RM 26.4. The pool and weir fish ladder for the dam is located on the left-bank, which is the side of the river where sediment and debris tend to accumulate, necessitating regular and frequent maintenance of the fish ladder to ensure unrestricted fish passage (Tom Burns, WDFW). Impassable conditions over as little as a week during the adult return period could significantly impair salmonid production from the watershed upstream of the dam. Poaching of returning adult salmon and steelhead is also a routine concern at the fish ladder.

Surface water withdrawals from the Pilchuck River at RM 23 by the City of Snohomish can reduce summer and fall low flow in the river by 10-20% (Pentec 1999). No assessment of effects to resulting downstream salmonid production is available but salmonid passage at the diversion can be affected at low flows (Chamblin, WDFW).

Model estimates of impervious surface are 12% for the lower Pilchuck, 7% for the middle Pilchuck, and 1% for the upper Pilchuck (Purser and Simmonds 2001, as cited in SBSRTC 2002 DRAFT). Extensive floodplain alteration, diking, and increases in development suggest that a reduction in base flows should be occurring in the lower Pilchuck, although no reduction in base flows has been identified.

There may be limited opportunity to acquire water from the City of Snohomish, although drought year acquisitions to maintain fish passage may be cost effective. The effects of this diversion on salmonid production should be further investigated.

French Creek and tributaries

Low stream flows affect salmon productivity by reducing the amount of rearing habitat. HSPF modeling looked at the potential for low stream flows to affect summer instream habitat (Carroll 2000). The model predicted that at anticipated future development, Upper Spada, Upper Stables, Ghost Horse, Chain Lake, Upper Cripple, tributary to Cripple, Trench, and Lords Hill tributary creeks would likely go dry in summer. Portions of Cripple Creek, Alston, Stables, and all of Trench Creek currently dry up in summer months. The HSPF modeling identified a corresponding significant increase in peak flow magnitude in the watershed. French Creek peak flows have increased approximately 11-12% from forested conditions; the historic 100-year flood approximately equals the current 50-year flood (Washington State Conservation Commission / Northwest Indian Fisheries Commission , Limiting Factors Analysis, 2002 DRAFT). Further increase in peak flows is likely as further development occurs in the watershed. Stormwater detention and ability to infiltrate stormwater is limited by ~3% of the watershed soils being glacial till, that does not infiltrate well. Like many Puget Sound streams, the expansion of impervious surfaces and exempt well threaten instream flows. (Washington State Conservation Commission / Northwest Indian Fisheries Commission , Limiting Factors Analysis, 2002 DRAFT). Limited opportunity exists to restore increase stream flow because opportunities to acquire surface waters are limited, and additional data is needed to determine the feasibility of acquiring groundwater to preserve surface flow.

Snoqualmie River

Fish resource agencies have reached an agreement with Puget Sound Energy to maintain a minimum 300 cfs flow between the base of the falls and the outfall for power plant 2, approximately 0.5 mile downstream (1998 subbasin workshop). The flow has been set to allow fish access to the plunge pool below Snoqualmie Falls.

There are water withdrawals from the river occurring for agriculture although the quantities are unknown; affects on instream flow are also unknown (1998 subbasin workshop). Minimum flows established in 173-507 WAC vary from 700 cfs in late August to September to 2800 cfs

between November and the end of June (Washington State Conservation Commission / Northwest Indian Fisheries Commission , Limiting Factors Analysis, 2002 DRAFT). Opportunities to acquire water from agricultural users in the lower end of this basin should be further investigated.

Tolt/NF Tolt River , Moss Lake Creek, Stossel Creek, North Fork Creek, SF Tolt River, and tributaries

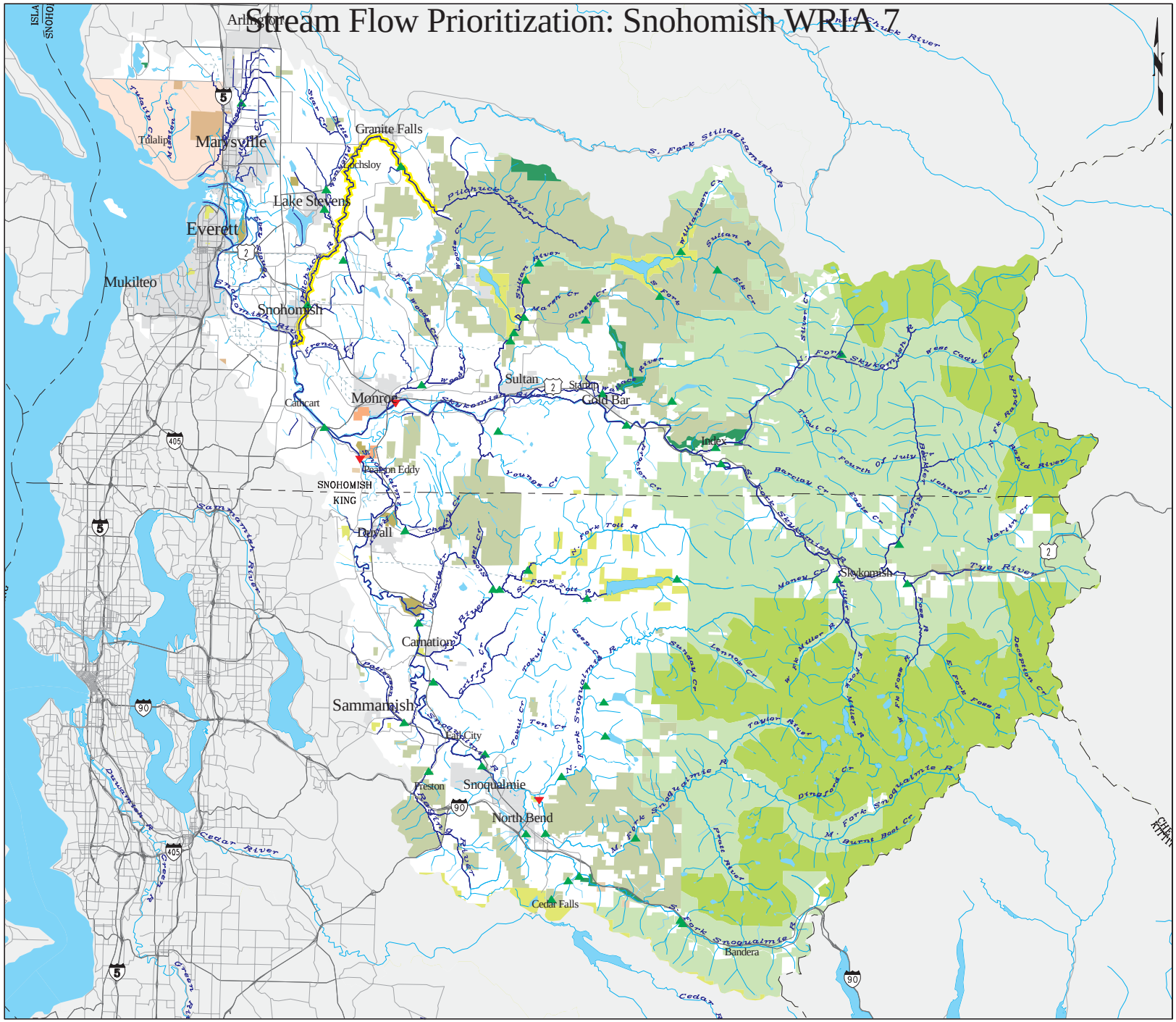
USGS gauge information before and after construction of the SF Tolt dam demonstrates altered peak flows, base flows, and flow timing since dam construction. (EBASCO Environmental 1993, as cited in SBSRTC 2002 DRAFT). The dam and associated reservoir on the SF Tolt were completed in 1963; the intent of the dam was for municipal water supply, and was not intended for flood control operations (Parametrix 2001). The SF Tolt flow is regulated by the SF Tolt water supply and hydroelectric projects. Water is withdrawn by the City of Seattle for municipal and industrial uses, under Superceding Reservoir Permit No. R-206 and Superseding Surface Water Permit No S1-10602. Instream flows are governed by a settlement agreement with resource agencies, associated with the federal license for FERC Project 2959 (FERC, 1988). Water storage in the SF reservoir has reduced lower Tolt River flood peaks by 29-36%, depending on the magnitude of the event (Parametrix 2001). Since reservoir flows are governed through FERC licensing and due to demand for municipal water, it is unlikely that water acquisitions would be feasible in this basin.

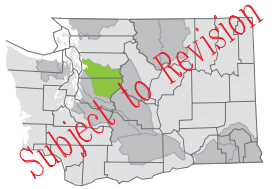
(Washington State Conservation Commission / Northwest Indian Fisheries Commission , Limiting Factors Analysis, 2002 DRAFT)

Other limiting factors

The analysis conducted by Haas and Collins (2001)(based primarily on Skagit data) suggests that the Snohomish River estuary is commonly a bottleneck to chinook production, with chinook experiencing density-dependent production constraints 45-87% of the time during the period 1968-1999. Several TAG participants question whether the model assumptions are accurate or valid enough to define the estuary as a “bottleneck”. Researchers have not been finding the degree of utilization of saltwater marshes by chinook that is represented in the model used by Haas and Collins (Houghton, Rowse). However, there is agreement on the importance of estuarine habitat, agreement that estuarine habitat has extensively altered, and that restoration of estuarine habitat is likely of highest priority in the lower watershed (Washington State Conservation Commission / Northwest Indian Fisheries Commission , Limiting Factors Analysis, 2002 DRAFT). The greatest reduction in coho salmon production capacity is estimated to have occurred through the disconnection and draining of large palustrine marshes within the floodplain (Haas and Collins 2001). It appears that more research may be necessary to determine the extent that estuary habitat is limiting in this basin prior to acquiring water to increase productivity for chinook and coho.

Stream Flow Prioritization: Snohomish WRIA 7





- US Forest Service
- US Wildlife Refuge
- US Parks/Recreation
- USFS Wilderness Area
- Bureau of Land Management
- US Dept. Defense/Energy
- Wa. Dept. of Fish & Wildlife
- Wa. Dept. of Naural Reasources
- State School/Hospital/Prison
- Wa. Parks & Recreation
- City/County Watershed/Park
- Tribal Lands
- Incorporated City

- Low priority stream
- Medium priority stream
- High priority stream
- Salmon/Bull Trout Spawning/Rearing area
- Other streams
- Canal/ditch/pipe

- USGS Stream Flow Gage
- Ecology Stream Flow Gage
- Water Right Purchase

- County
- Highway
- Local Paved Roads

WDNR/Ecology - Major Public Lands 2002 100k
WDFW/Ecology - Hydrography, 2000 100k
Ecology - WRIA, 2002 24K
WDOT - Transportation, 2001 24K
WDFW - Stream Flow Prioritization 2002
WDFW - Spawning/Rearing Areas 2002 100k
USGS/Ecology - Stream Gages 1:100k

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